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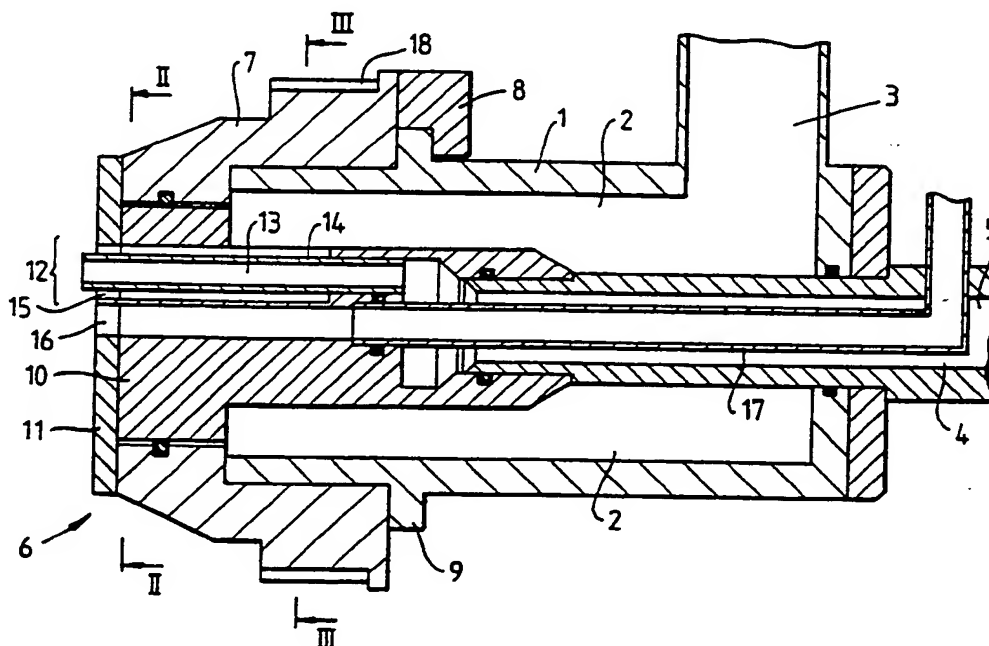
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(54) Title: METHOD AND APPARATUS FOR MANUFACTURING COEXTRUDED PRODUCTS



(57) Abstract

A method for manufacturing coextruded products by coextruding continuous strands of one extrudable material and enveloping sheaths and twisting these sheathed strands about each other for at least part of a full revolution. An apparatus for manufacturing such products comprises a multiplicity of nozzles each having a central bore with feeding means and an annular opening surrounding this bore having separate feeding means, which nozzles are arranged for mutual movement comprising at least part of a rotation.

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Method and apparatus for manufacturing coextruded products

Co-extrusion is a widely applied method for manufacturing compound products in various areas of industry, e.g. in plastics industry and food industry. Examples of products made thereby in the latter industry being ice cream logs having layers of different flavours and dough products enclosing a filling of fruit puree or minced meat.

Although this technique provides for a wide variety of shapes and product combinations there is still a need for further variation of shapes for improved attractiveness of the products.

To comply with this requirement the present invention provides a method for manufacturing co-extruded products, comprising extruding a continuous strand of one extrudable material and simultaneously an enveloping sheath of a second different extrudable material wherein at least a second sheathed strand is extruded while twisting these strands about each other for at least part of a full revolution.

In a preferred embodiment the extrusion is effected through nozzles arranged on a common supporting structure.

The invention also relates to an apparatus for executing this method, comprising a multiplicity of nozzles each having a central bore having a feeding means and an annular opening surrounding said bore having separate feeding means, these nozzles being arranged for effecting a mutual movement which comprises at least part of a rotation about each other.

In a preferred embodiment these nozzles are arranged on a common structure, which is mounted for rotation about an axis.

In a very convenient embodiment for construction reasons

the common structure forms a turret which is rotationally mounted on a common housing, comprising at least one annular chamber having feeding means, concentrically arranged about a central chamber having separate feeding means, the annular chamber constantly communicating with the annular openings of the nozzles and the central chamber with the central bores thereof.

Using the above method and apparatus products can be produced which up till now could be made by hand only.

The invention will be explained in a non-restrictive manner in the following description of some preferred embodiments, reference being had to the drawings wherein

fig. 1 is an axial sectional view of an extrusion apparatus according to the invention,  
fig. 2 is a cross sectional view along the line II-II in fig. 1,  
fig. 3 is a cross sectional view along the line III-III in fig. 1 and  
fig. 4 is a cross sectional view similar to fig. 2 of an alternative embodiment of the apparatus according to the invention.

The extrusion apparatus of the invention as shown in figures 1 to 3 comprises a cylindrical housing 1, having an annular chamber 2 with a feeding conduit 3 and a central chamber 4, extending along the axis of the cylindrical housing, having a feeding conduit 5.

The annular chamber 2 is closed at one axial end and is supporting a turret 6 which is mounted for rotation at the other axial end. For convenience of manufacture and maintenance the turret 6 comprises several component parts: an annular head 7, tightly fitting about the housing, but being rotationally movable thereto, a number of clamps 8 bolted to the head and enclosing an annular outer ridge 9 and a plug portion 10 united to the annular head 7 by means of a circular front plate 11.

Suitable seals (not shown, but known as such) are provided between the housing 1 and the turret 6 and the parts thereof to prevent unintended flowing out of material from the chambers 2 and 4 but to allow mutual rotational movement between the turret 6 and the housing 1.

As best may be seen from fig. 2 the turret 6 is provided with three nozzles 12 at a uniform pitch, each having a central opening 13 communicating with the central chamber 4 through a pipe 14 supported in the plug portion 10 and an annular opening 15 communicating with the annular chamber 2 through suitable bores in the plug portion. An additional central nozzle 16 is arranged between the nozzles 12 on the axis of the turret. A feed pipe 17 is arranged along the axis of the turret and sealed thereto allowing rotational mutual movement.

The cross sectional view of fig. 3 shows a toothed crown 18 for driving the turret 6.

In fig. 4 an alternative embodiment of the apparatus according to the invention is shown, the difference lying in the design of the nozzles in the turret.

In this embodiment the turret 19 is provided with two nozzles similar to the ones as shown in figs. 1 to 3 each having a central opening 20 and an annular opening 21.

The apparatus is used as follows:

One type of extrudable material is fed through the conduit 3 into the annular chamber 2 and from there through the annular openings 15, 21 in the turret 6 which is driven for rotation by a suitable motor means (not shown) camming with the toothed crown 18.

A second extrudable material is fed through the feeding conduit 5 into the central chamber 4 and subsequently through the central bores 13, 20 of the nozzles.

Co-extruded strands comprising a core of the second material and an enveloping sheathing of the first material are obtained, which due to the movement of the turret are twisted about each other. If desired a third extrudable material can be extruded through the feed pipe 17 and out of the central nozzle 16 as shown in the embodiment of fig. 1 to 3.

Suitable combinations of materials being:

	<u>first mat'l</u>	<u>second mat'l</u>	<u>third mat'l</u>
I	biscuit mix	ice cream	-
II	brioche dough	sausage meat	mustard
III	" "	" "	tomato
			ketchup
			pickles
IV	" "	cheese	-
V	" "	pizza sauce	-
VI	" "	apple sauce	-
VII	short crust pastry	apple sauce	-
VIII	potato mash	pizza sauce	-
IX	" "	flaked tuna	-
X	chicken meat	cheese + garlic sauce	-
XI	sausage meat	apple sauce	-
XII	sausage meat	baked bean puree	-

The extruded products were chopped in suitable lengths, for instance 8 cm for bar products or 4 cm for one-bite products. Products X to XII were coated in breadcrumbs after extrusion and cutting.

Compositions of the above ingredients were as follows:

(percentage are by weight)

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	<u>Pizza Sauce</u>		<u>Brioche Dough</u>	
	Mixed vegetables	26.1%	Flour	52.6%
	Minced beef	10.5%	Whole egg	13.4%
	Cheese	9.9%	Fat	9.8%
5	Tomato puree	7.9%	Yeast	3.0%
	Sugars	5.1%	Sugar	1.5%
	Salt	3.6%	Salt	0.9%
	Starch	3.0%	Water	18.8%
	Flour	2.3%		
10	Margarine	2.3%	<u>Shortcrust Pastry</u>	
	Flavours etc.	1.8%	Flour	56.9%
	Water	27.5%	Margarine	28.4%
			Full cream powder	1.3%
			Baking powder	0.5%
	<u>Ice Cream</u>		Salt	0.4%
15	Butter oil	12.6%	Water	12.5%
	Dried milk powder	10.7%		
	Sugar	9.0%		
	Dextrose	7.0%	<u>Biscuit mix</u>	
	Spray dried glucose	5.0%	Digestive biscuit	54.6%
20	Hazelnut paste	2.0%	Golden syrup	22.7%
	Whey powder	1.8%	Margarine	22.7%
	Stabilizer + emul.	0.5%		
	Water	51.4%		
25	The other ingredients were ready retail products.			

Claims

1. A method for manufacturing co-extruded products, comprising extruding a continuous strand of one extrudable material and simultaneously an enveloping sheath of a second different extrudable material wherein at least a second sheathed strand is extruded while twisting these strands about each other for at least part of a full revolution.
2. A method according to claim 1, characterized in that the extrusion is effected through nozzles arranged on a common supporting structure.
3. An apparatus for manufacturing co-extruded products comprising a multiplicity of nozzles each having a central bore having a feeding means and an annular opening surrounding said bore having separate feeding means, these nozzles being arranged for effecting a mutual movement which comprises at least part of a rotation about each other.
4. An apparatus according to claim 3, characterized in that the nozzles are arranged on a common structure, which is mounted for rotation about an axis.
5. An apparatus according to claim 4, characterized in that the common structure forms a turret which is rotationally mounted on a common housing, comprising at least one annular chamber having feeding means, concentrically arranged about a central chamber having separate feeding means, the annular chamber constantly communicating with the annular openings of the nozzles and the central chamber with the central bores thereof.



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Fig.1.

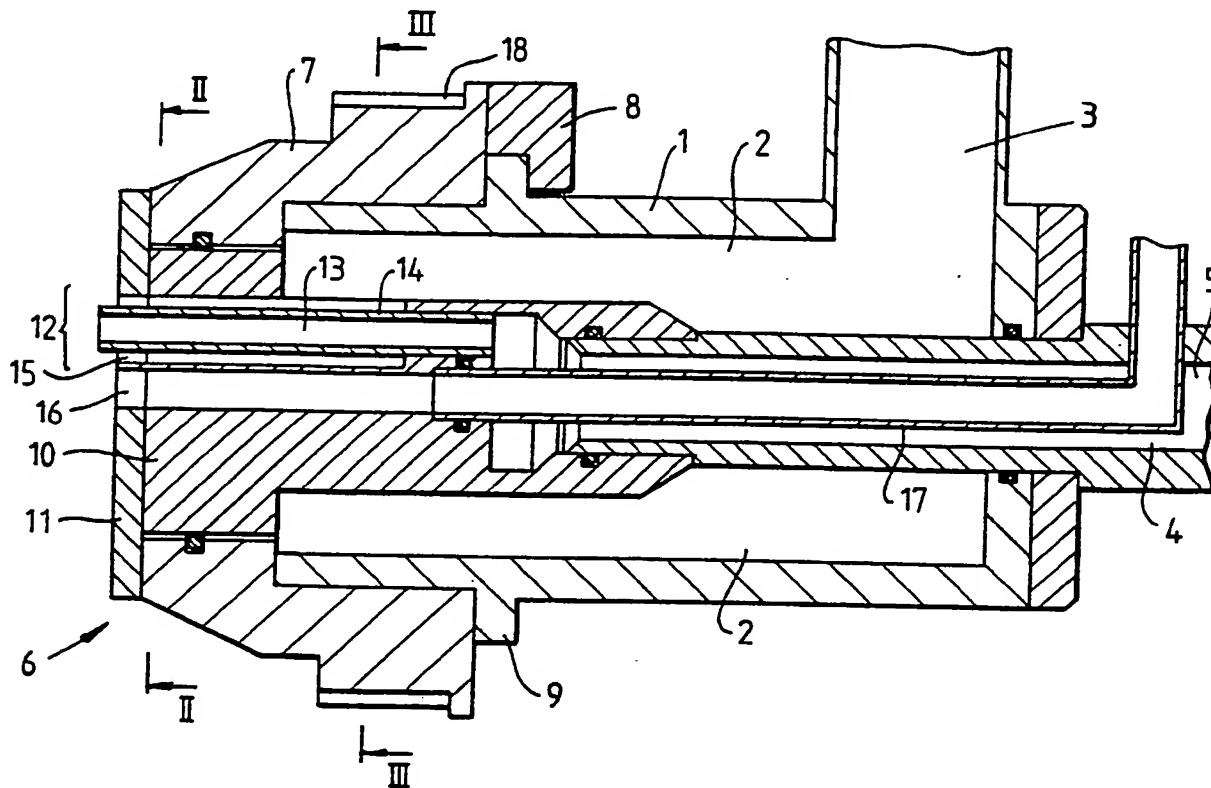
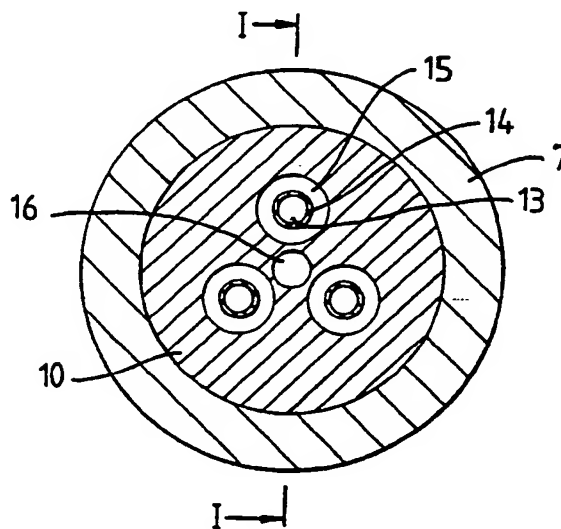


Fig. 2.



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Fig. 3.

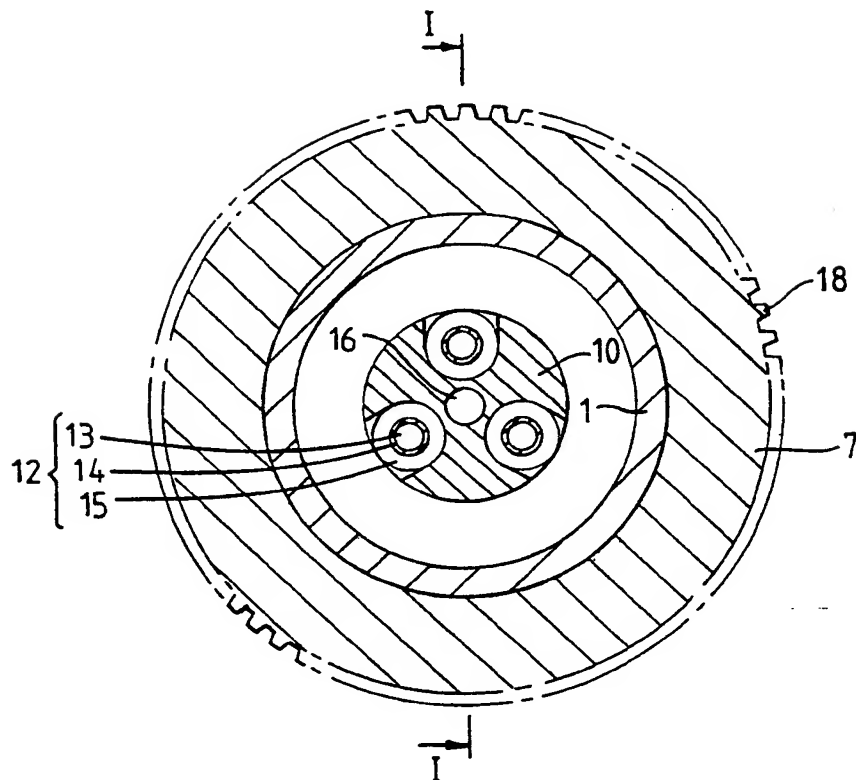
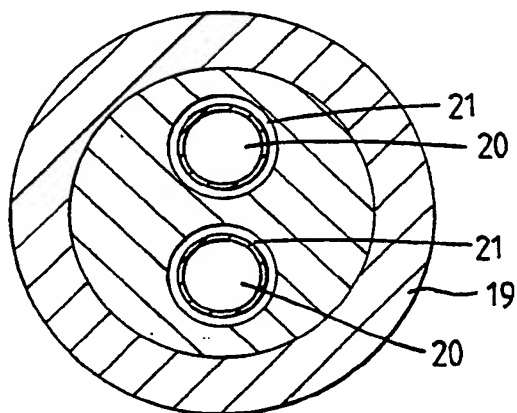


Fig. 4.




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## INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 92/01496

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. 5 B29C47/06; B29C47/04; A23P1/12; B29C47/24		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
Int.Cl. 5	B29C ; A23P ; A21C	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>		
Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
A	EP,A,0 044 689 (UNILEVER PLC) 27 January 1982 see the whole document, especially figure 3 ---	1-5
A	US,A,4 859 165 (HOASHI) 22 August 1989 see figure 1 ---	1-5
A	GB,A,1 349 843 (CREATORS LIMITED) 10 April 1974 see figures ---	1-5
A	US,A,2 856 868 (K.K. KENNEDY) 21 October 1958 ---	1,3
A	US,A,4 288 463 (GROFF ET AL.) 8 September 1981 ---	1,3
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<sup>10</sup> Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "A" document member of the same patent family		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search 28 OCTOBER 1992		Date of Mailing of this International Search Report 04. 11. 92
International Searching Authority EUROPEAN PATENT OFFICE		Signature of Authorized Officer LASSON Cedric 

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Category °	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
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**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.**

GB 9201496  
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.  
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